Research Article

# A study of potentially inappropriate medication used in geriatric patients at tertiary care center

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## Abstract

**Introduction:** It is a well-known fact that when compared to the younger crowd; the elderly consume relatively more medications. Since the increased use of drugs has been associated with the increase in the prevalence of chronic diseases, there has been a growing concern regarding the excessive use and unwise prescription of drugs among the elderly. Due to various factors such as, comorbidity, variations in the process of ageing and changes related to the varied use of drugs, the elderly population forms a thoroughly heterogeneous group. As an individual grows older the side effects of drugs have increased harmful effects. However, there is no substantial data to prove this "cliché" of geriatric medicine. One reason is due to the fact that the clinical scenario is far more complicated than one can imagine because of factors like differences in the ageing process and the unpredictable nature of the drug effects on individuals both adverse and beneficial outcomes. **Aims and Objective:** To study of potentially inappropriate medication used in geriatric patients at tertiary care center. **Materials and Method:** The present cross sectional study was conducted in the Outpatient departments of Kannur Medical College, Kannur from January 2014 to March 2014. Total 350 patients who were attending Outpatient departments were in the geriatric age group selected. Information retrieved from the files included the age and sex, medical conditions (diagnosis) for which the patient was receiving treatment and the prescribed drugs and their dosages. The drugs were classified according to the chemical therapeutic anatomical (ATC) system developed by WHO[8]. The PIMs were identified with help of the updated Beers criteria 2012. **Results:** The total number of drugs prescribed in 350 patients was 1976 with 5.6457±2.10339 drugs prescribed per patients with a range from 2 to 11.The drug clopidogrel (7.0%) was the most prescribed, followed by pantoprazole (6.6%), atorvastatin 6.4%, vitamin B complex 4.9%, paracetamol 4%.According to Beers criteria 85(26%) of the elderly received PIM in which 24.3% received at least one PIM and 1.8% received multiple PIMs. Out of a total of 1976 medication 108 were potentially inappropriate medication taking into consideration PIMs independent and dependent on diagnosis. **Conclusion:** Thus from the above results and discussion we conclude that potentially inappropriate medication is used commonly in geriatric patients. Alprazolam was the most commonly used PIM in elderly patients.

**Keywords:** potentially inappropriate medication, geriatric patients.

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## INTRODUCTION

In India, the elderly population (aged 60 and above) is growing steadily over the decades. The elderly constituted 5.6% of the population in 1961, but the percentage has increased to 7.4% in 2001. Interestingly, there is a significant difference between the male and female population when considering the rise in the ageing population. In males, the rise is from 5.5% to 7.1%, while in the female population the rise in population is more steep (from 5.8% to 7.8%) from 1961 to 2001. Also, the elderly population is greater in the rural areas when compared to the urban areas[1]. It is a well-known fact that when compared to the younger crowd; the elderly consume relatively more medications. Since the increased use of drugs has been associated with the increase in the prevalence of chronic diseases, there has been a growing concern regarding the excessive use and unwise prescription of drugs among the elderly[2]. Due to various

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factors such as, comorbidity, variations in the process of ageing and changes related to the varied use of drugs, the elderly population forms a thoroughly heterogeneous group[4]. As an individual grows older the side effects of drugs have increased harmful effects. However, there is no substantial data to prove this "cliché" of geriatric medicine. One reason is due to the fact that the clinical scenario is far more complicated than one can imagine because of factors like differences in the ageing process and the unpredictable nature of the drug effects on individuals both adverse and beneficial outcomes[3,4]. Potentially inappropriate medication (PIM) is described as "a drug in which the risk of an adverse event outweighs its clinical benefit, particularly when there is a safer or more effective alternate therapy for the same condition"[5]. Studies related to PIM in the elderly have indicated that the elderly are more likely to suffer from drug reactions and are several times hospitalized for the same. A considerable number of such instances can be avoided by careful observation and prudent drug prescription[4]. This vulnerable population should be treated by identifying potentially improper medications to minimize the harmful effects of pharmacotherapy.

## AIMS AND OBJECTIVE

To study of potentially inappropriate medication used in geriatric patients at tertiary care center.

## MATERIALS AND METHOD

The present cross sectional study was conducted in the Outpatient departments of Kannur Medical College, Kannur from January 2014 to March 2014. Patients who were attending Outpatient departments were in the geriatric age group selected by using following inclusion and exclusion criteria.

### Inclusion Criteria

- Age group above 65 years.
- Genders of both sexes.
- Patients ready to provide informed, written consent.

### Exclusion Criteria

- Patients who are below 65 years of age.
- Patients who are not willing to participate in the study

Thus by using the above mentioned inclusion and exclusion criteria and prevalence of 7.42% in the proportion[6], the sample size was calculated and it was 305 was rounded to 350. After receiving ethical clearance from the Institutional Human Ethics Committee, Kannur Medical College, Kannur and Informed, written consent was obtained from each subject the study was started. Heads of all clinical departments in the hospital were approached and the type of study was explained to them and their permission to conduct the study was taken. Permission was also taken from the Medical Superintendent to access the medical records. Information retrieved from the files included the age and sex, medical conditions (diagnosis) for which the patient was receiving treatment and the prescribed drugs and their dosages. The drugs were classified according to the chemical therapeutic anatomical (ATC) system developed by WHO[7].The PIMs were identified with help of the updated Beers criteria 2012. According to these criteria, drugs which are prescribed inappropriately are classified into one of the following categories:

- Category A: Potentially inappropriate medications and classes to avoid in older adults.
- Category B: Potentially inappropriate medications and classes to avoid in older adults with certain diseases and syndromes that the drugs listed can exacerbate.
- Category C: Medications to be used with caution in older adults.

Since category C were drugs to be used with caution they were not included, in calculating total PIMs. The baseline characteristics were described by numbers, percentages and averages with its standard deviation.

## RESULTS

A total of 350 elderly patients were included in this study. The data can be analyzed and presented as follows,

**Table 1:** Age and sex distribution of patients

| | | No. of patients | Percentage |
|---|---|---|---|
| Age group | 65-75 | 245 | 70.0 |
| | 76-85 | 91 | 26.0 |
| | 85 above | 14 | 4.0 |
| Sex | Male | 197 | 56.3 |
| | Female | 153 | 43.7 |

It was observed that the mean age was 72.43 years. Distribution of the patients according to age groups revealed 70% of the patients fell into the 65–75 years bracket. It seen that 56.3% were males and 43.7% were females.

**Table 2:** Drug prescription in geriatric patients

| | Total | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Drugs | 1976 | 2.00 | 11.00 | 5.6457 | 2.10339 |

It was observed that the total number of drugs prescribed in 350 patients were 1976 with mean 5.65± 2.10 drugs prescribed per patients with a range from 2 to 11.

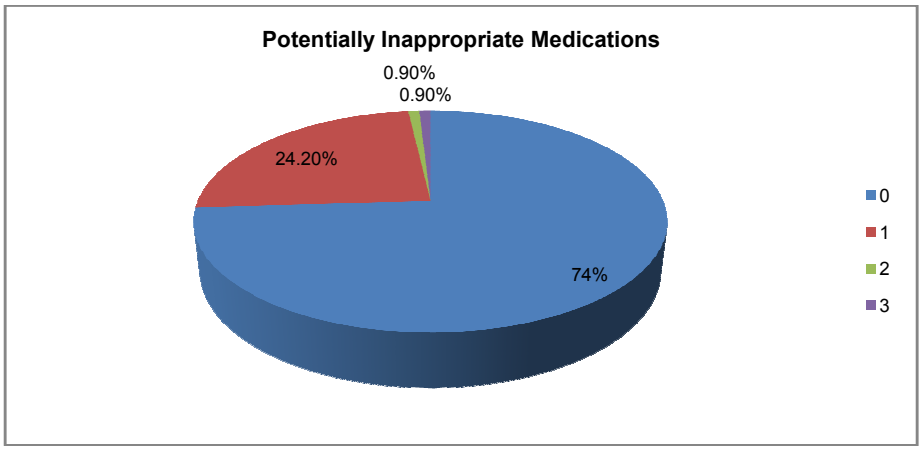
**Table 3:** Classification and sub classification of drugs according to ATC classification

| Groups and sub groups | N | % |
|---|---|---|
| **Alimentary tract and metabolism** | **90** | **24.3** |
| Antidiarrheals | 3 | 0.8 |
| Antiemetic | 3 | 0.8 |
| Drugs for acid related disorders | 21 | 5.7 |
| Drugs for constipation | 9 | 2.4 |
| Drugs for functional gastrointestinal disorders | 9 | 2.4 |
| Drugs used in diabetes | 18 | 4.9 |
| Mineral supplements | 12 | 3.2 |
| Vitamins | 15 | 4.1 |
| **Cardiovascular system** | **72** | **20.2** |
| Antithrombotic agents | 12 | 3.2 |
| Beta blockers | 15 | 4.1 |
| Calcium channel blockers | 9 | 1.6 |
| Cardiac therapy | 9 | 1.6 |
| Diuretics | 12 | 3.2 |
| Lipid modifying | 6 | 1.6 |
| Psychoanaleptics | 3 | 0.8 |
| Rennin and angiotensin system | 15 | 4.1 |
| **Nervous system** | **57** | **15.5** |
| Analgesics | 6 | 1.6 |
| Antiepileptic | 15 | 4.1 |
| other nervous system drugs | 6 | 1.6 |
| psycho analeptics | 30 | 8.2 |
| **Anti infective for systematic use** | **42** | **11.3** |
| Antibacterial | 3 | 0.8 |
| Antibacterial for systemic use | 33 | 8.9 |
| Antimycotics for systemic use | 6 | 1.6 |
| **Musculoskeletal system** | **33** | **8.9** |
| Anti gout | 3 | 0.8 |
| Anti-inflammatory and ant rheumatic products | 27 | 7.3 |
| Muscle relaxants | 3 | 0.8 |
| **Respiratory system** | **27** | **7.2** |
| Antihistamines for systemic use | 6 | 1.6 |
| Cough and cold preparations | 6 | 1.6 |
| Drugs used in obstructive airway disease | 9 | 2.4 |
| Nasal preparations | 6 | 1.6 |
| **Blood** | **21** | **5.7** |
| Antianaemics | 15 | 4.1 |
| Blood substitutes | 3 | 0.8 |
| Other hematologicals | 3 | 0.8 |
| **Others** | **30** | **6.9** |

There were 1976 medications prescribed in this study out of which (24.30%) affected alimentary tract and metabolism, 20.20 % on the cardiovascular system and 15.50% on nervous system.11.30% drugs were anti infectives for systemic use, 7.20% respiratory system drugs, 5.70% affected blood system and 6.90% were under other category according to WHO ATC classification. Table 4 and Figure 2 shows the medications the participants used most, classified into their pharmacological/therapeutic subgroups.

**Table 4:** Potentially Inappropriate Medications

| PIM (Number of times ) | Number of patients | Percent |
|---|---|---|
| 0 | 259 | 74.0% |
| 1 | 85 | 24.2% |
| 2 | 3 | 0.9% |
| 3 | 3 | 0.9% |
| **Total** | **350** | **100.0%** |




Beer's criterion was used to identify the Potentially Inappropriate Medications. It was seen that 91 (26%) cases had received Potentially Inappropriate Medications. Out of which 85 had received single inappropriate medication where as 6 had received multiple PIM.

**Table 5:** Potentially Inappropriate Medications (PIMs) independent of condition

| Drug name | Number of times | Percent (%) |
|---|---|---|
| Alprazolam | 30 | 35.7 |
| Amitryptline | 9 | 10.7 |
| Clonazepam | 9 | 10.7 |
| Diazepam | 3 | 3.6 |
| Dicyclomine | 6 | 7.1 |
| Digoxin | 6 | 7.1 |
| Nifedipine | 3 | 3.6 |
| Nortryptilline | 3 | 3.6 |
| Phenobarbital | 3 | 3.6 |
| Spironolactone | 12 | 14.3 |
| **Total** | 84 | **100** |

Alprazolam was identified as PIMs in 30 cases, followed by spironolactone in 12 while amitriptyline and clonazepam were both implicated in nine cases. Diazepam, dicyclomine, digoxin, nifedipine, nortryptilline, phenobarbital and spironolactone were the remaining identified PIMs.

## DISCUSSION

For the purpose of our study, we selected patients more than age of 65years and it was seen that the mean age was 72.43years. The findings of our study were found to be consistent with the findings of other studies like the study conducted by Taufik G. Mominet.al[8] in Ahmedabad. In a study by Fadare JO *et al*[9], distribution of the patients according to age groups revealed that 61.8% of the patients fell into the 65–74 years bracket while 30.5% and 7.7% were in the 74–85 years and above 85 years categories respectively and the mean age was 72.8 ± 7.2 years which was similar to our findings. Out of a total of 350 patients, 56.3% were males and 43.7% were females. It should be noted that in many countries, females tend to have a higher life expectancy than males and they usually form the majority. However, the situation is different in a few countries/places and this is clearly shown by some case studies done in the Indian population. For instance, a predominantly male population of 60% was found in a study conducted in Gujarat by Shah R B *et al*[10]. The total number of drugs prescribed in 350 patients was 1,976 with 5.6457±2.10339 drugs prescribed per patient which

was similar to the findings of Vieira de Lima TJ *et al*. in a Brazilian study which had an average of 5.7 medications[11]. In this study, the classes of drugs most commonly used, according to the ATC classification, were drugs acting on the alimentary tract and metabolism, cardiovascular system and nervous system accounting for 60.0% of the medications used; which is similar to a study done in Brazil by De Oliveira Alves C *et al*. In our study the most commonly used drug is pantoprazole whereas in the case of the study conducted by De Oliviera Alves it is another proton pump inhibitor omeprazole[12]. A total of 91 patients out of 350, i.e. 26% of elderly patients received potentially inappropriate prescription of at least one drug. These findings were in agreement with a study performed by Zaveri HG *et al*[6], in which 23.59% older adults received at least one potentially inappropriate drug prescription. In a study carried out in Japan in a long-term facility, the prevalence of inappropriate medication prescription was 21% according to the criteria independent of disease or condition and 18% according to the criteria dependent on disease or condition, thus leading to an overall prevalence of 39.1%. Our study results were in the same range as results from studies conducted in the USA (27.5%) and Iran (27.6%). In a study among the elderly in Croatia, the prevalence of inappropriate choice of drugs was 2.2%. The most common inappropriate drug was a long-acting benzodiazepine, diazepam. In the study, computerized pharmacy data was used as a screening tool in efforts to improve the quality of drug prescribing in Croatia. Results of the study suggested a low rate of potentially inappropriate prescribing for the elderly in Rijeka, Croatia and this was made possible by the use of computerized systems in the pharmacy highlighting the importance of information technology in medication management[13]. Potentially inappropriate prescribing and cost outcomes for older people was studied by Cahir *et al*. in Ireland and their analysis showed that one-third of the Irish population aged 70 years were prescribed at least one potentially inappropriate medication in 2007 based on European criteria.[14]

## CONCLUSION

Thus from the above results and discussion we conclude that potentially inappropriate medication is used commonly in geriatric patients. Alprazolam was the most commonly used PIM in elderly patients.

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